Depression in youth with autism spectrum disorders: The role of ASD vulnerabilities and family-environmental stressors

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The Version of Record of this manuscript has been published and is available in Journal of Mental Health Research in Intellectual Disabilities, Volume 8, Issue 3-4, 2015 http://www.tandfonline.com/doi/abs/10.1080/19315864.2015.1017892

Abstract

Individuals with Autism Spectrum Disorders (ASD) are at an increased risk of mental health problems, with depression being one of the most common presenting issues. The current study used a diathesis-stress model to investigate stressors [parent distress and negative life events (NLE)] and vulnerabilities (youth age and intellectual functioning) as predictors of depressive symptoms in youth with ASD. Parents of youth with ASD (*N*=91; ages 7 to 25 years) completed online questionnaires about demographic variables, distress, NLE, and youth depression. High parent distress and exposure to 3 or more NLE were associated with symptoms of depression in individuals with ASD. Also, youth with ASD who were younger, or who were noted to have average or above intellectual functioning, were reported to have higher depression levels than other individuals with ASD. None of the vulnerabilities were found to moderate the relationships between stressors and depression.

Keywords: ASD, youth depression, parent distress, negative life events

Evidence suggests that there are higher rates of mental health problems for individuals with Autism Spectrum Disorder (ASD) compared to typically developing populations, although rates vary between studies (Simonoff et al., 2008; Skokauskas & Gallagher, 2012). A recent population-derived study of children with ASD found that approximately 70% of youth had a comorbid mental health disorder and approximately 40% were reported to have two or more disorders (Simonoff et al., 2008). Depression can be a significant problem for individuals with ASD of all ages, with researchers suggesting that it is one of the most common associated conditions (Ghaziuddin, Ghaziuddin, & Greden, 2002). The prevalence rate of depression in typically developing youth is approximately 12% (Merikangas et al., 2010), while depression in youth with ASD has been reported as ranging from 4% to 58% (Lainhart, 1999; Stewart, Barnard, Pearson, Hasan, & O'Brien, 2006; Ghaziuddin, Tsai, & Ghaziuddin, 1992).

This large variability in prevalence rates has been attributed to the use of clinic-referred samples as opposed to community-samples and the representativeness of findings to the general ASD population may vary due to artificially high rates in clinic samples. Other reasons for the discrepant rates include differences in age, sample characteristics, methods of inquiry, and the fact that few instruments exist for testing mental health disorders in youth with ASD (Lainhart, 1999; Magnuson & Constantino, 2011). Two recent studies employed standardized assessment tools, which had been previously used for groups with intellectual disabilities, and found more conservative rates than studies using assessment tools for typically developing children and youth. Leyfer et al. (2006) used the Autism Comorbidity Interview with parents of 109 youth with ASD (aged 5 to 17 years), and reported a prevalence rate of major depression in

10% of the sample. In contrast, Simonoff et al. (2008) used the Child and Adolescent Psychiatric Assessment with parents of 112 youth with ASD (aged 10 to 14 years) and found a lower prevalence of major depression, at 1.5%. High rates of subsyndromal depressive symptomatology were noted in both studies (10.4% in Simonoff et al.; 14% in Leyfer et al.). For youth with ASD, depression has been associated with other mental health problems, such as anxiety, obsessive-compulsive behaviors, and behavioral problems (Ghaziuddin et al., 2002), as well as an increased likelihood of psychiatric hospitalization (Mandell, 2008).

The Diathesis-Stress model of psychopathology is a useful framework to identify the combination of multiple risk factors that may be involved in triggering the emergence of depression (Burke & Elliott, 1999). Diatheses refer to characteristics of an individual, either inherited or acquired, which leave the individual susceptible to the impact of environmental stressors. Stressors are conceptualized as provoking factors or events, which could exacerbate an individual's vulnerabilities, and may elicit the onset of psychopathology (Burke & Elliott, 1999). Typically developing individuals with vulnerabilities, such as a familial predisposition for mental health problems, are at greater risk of developing a mental health problem when combined with a stressor compared to those without a vulnerability who experience the same stressor (Burke & Elliott, 1999; Mourad, Levendosky, Bogat, & von Eye, 2008). Said another way, the model proposes that it is the interactions among individual vulnerability and stressors that are related to the presentation of mental health problems. While the diathesis-stress model has not directly been tested in individuals with ASD, previous work has found support for the model in siblings of youth with ASD by examining the presence of Broad Autism

Phenotype features and family-environmental risk factors as predictors of youth distress (Orsmond & Seltzer, 2009; Petalas et al., 2012). It has also been used as a framework to identify important variables related to depression in adults with intellectual disabilities (Esbensen & Benson, 2006). The main aim of the current study was to investigate the relations among stressors and youth vulnerabilities as they relate to depression in individuals with ASD.

Vulnerabilities Related to Depression in Youth with ASD

Intellectual functioning has been identified as a risk factor for mental health problems in youth with ASD, with higher functioning individuals showing greater awareness of their social difficulties than lower functioning individuals (Solomon, Goodlin-Jones, & Anders, 2004; Sterling, Dawson, Estes, & Greenson, 2008). In a recent study of verbally fluent youth and young adults with ASD (Gotham, Unruh, & Lord, 2014), participants reported cognitive symptoms of depression (e.g., negative attributions) more than affective or somatic symptoms, suggesting a strong cognitive component to depression in this population. It follows that the cognitive aspects would be most seen in individuals with higher intellectual functioning and fewer severe sociocommunicative impairments.

Age may be a second vulnerability factor for individuals with ASD, due to age-related increases in social situational complexity and in social awareness (Ghaziuddin et al., 2002; McPheeters, Davis, Navarre, & Scott, 2011). Indeed, in the typically developing literature, prevalence rates of depression increase in adolescence (Cicchetti & Toth, 1998), and then decline during young adulthood (18-25 years; Galambos, Barker, & Krahn, 2006). Symptoms of internalizing disorders require a certain degree of cognition

and social awareness, which may not be present in younger children, but may emerge as children enter adolescence (Mayes, Calhoun, Murray, & Zahid, 2011). Adolescents may be more aware of their difficulties in interactions with peers than are children, which can make exposure to more complex social situations discouraging for adolescents with ASD. Vulnerability to isolation or rejection can be a concern for adolescents with ASD, along with higher risk for mental health problems including depression (Tse, Strulovitch, Tagalakis, LinyanMeng, & Fombonne, 2007; Mayes et al., 2011).

Stressors Related to Depression in Youth with ASD

The literature is clear that familial (e.g., parent psychopathology) and extra-familial (e.g., negative life events outside of the family) factors play an important role in the presentation of mental health disorders. Parent mental health problems can be conceptualized as a stressor in predicting the onset of mental health problems in typically developing youth and those with ASD (Marmorstein & Iacono, 2004; Totsika, Hastings, Emerson, Lancaster, & Berridge, 2011). In the ASD literature, Totsika and colleagues (2011) investigated maternal mental health and emotional problems in children ages 7 to 13 years using a large, national survey on mental health problems, and found that maternal emotional disorder was a significant risk factor for child behavioural and emotional problems. More recently, Totsika and colleagues (2013) used cross-lagged models to investigate bidirectional relations for maternal well-being and behaviour problems in youth with ASD across 3 time points. Although child behaviour problems were not significant risk factors for later parent well-being, maternal psychological distress, lower life satisfaction, and physical health limitations increased the risk of children developing behaviour problems. While these studies suggest that parent

psychopathology is a risk factor for child mental health, others have noted a bi-directional nature to the relationship, with parental stress and child behaviour problems exacerbating one another over time (Lecavalier, Leone, & Wiltz, 2006). These relationships may also reflect a possible genetic predisposition towards mental health problems or emotional difficulties in certain families (Lewis, Collishaw, Thapar, & Harold, 2014).

Findings regarding the impact of parent psychological distress specifically on internalizing problems (such as depression) in youth with ASD have been equivocal. Mazefsky, Conner, and Oswald (2010) investigated the relationship between maternal psychological distress and child depression and anxiety in children with ASD. Approximately 75% of children could be correctly identified as having depression or anxiety based on maternal reports of their own current psychological distress symptoms, with such distress accounting for 43% of the variance. Conversely, Skokauskas and Gallagher (2012) failed to find a relationship between parent psychological distress and internalizing symptoms in youth with ASD. It may be that links between exogenous stressors and mental health problems can be elucidated when studies focus on specific mental health conditions (Mazefsky et al., 2010), rather than collapsing symptoms across all internalizing problems (Skokauskas & Gallagher, 2012). Parent distress as a risk factor for depression is particularly concerning for families with a child with ASD, as mental health problems tend to be elevated compared to families of typically developing children and children with other disabilities (Jeans, Santos, Laxman, McBride, & Dyer, 2013; Estes et al., 2009).

Negative stressful life events (NLE) are also significant predictors of depression for typically developing individuals and for individuals with ASD (Kendler, Karkowski,

& Prescott, 1999; Ghaziuddin, Alessi, & Greden, 1995; Goodyer, Germany, Gowrusankur, & Altham, 1991). Such experiences consist of difficult proximal situations in a person's life, which require a readjustment on the part of the individual involved (Coddington, 1972), such as death of a family member, parental divorce, or loss of a job. In the typically developing population, these kinds of life stressors have been associated with poor psychological functioning, including increased levels of distress, depression, intrusive thoughts, post traumatic stress, and suicidal ideation (Schmidt & Joiner, 2004; Adams & Adams, 1996; Meiser-Stedman, Dalgleish, Yule, & Smith, 2012; Copeland, Keeler, Angold, Costello, 2010).

Similarly, in the ASD and ID population, these kinds of life stressors have been associated with poor psychological functioning, including increased aggression/destructive behaviours, affective/neurotic disorder, and depression (Owen et al., 2004; Hastings, Hatton, Taylor, & Maddison, 2004; Ghaziuddin et al., 1995). Stressful life events are often related to changes in the environment (e.g., change in group home, change in education, etc.), so for individuals with ASD who have difficulties adapting to change, such events may be especially difficult. Hastings and colleagues (2004) examined the relation between NLE that had occurred over the past year and psychiatric symptoms in adults with ID, and found that having one or more life event explained a significant amount of variance in classifying the presence of an affective disorder. Both retrospective and prospective studies have found support for the relationship between significant life events and psychological problems in individuals with intellectual and developmental disabilities (e.g., Ghaziuddin et al., 1995; Owen et al., 2004). Adults with developmental disabilities, including autism, with recent NLE

exposure have been found to be at a higher risk of affective/neurotic disorder compared to those without exposure (Owen et al., 2004), and children with PDD-NOS and depression were found to have experienced more NLE in the year prior to the onset of depression (Ghaziuddin et al., 1995). Howlin and Clements (1995) found prospective evidence that experiences of abuse in a group of youth with PDD-NOS were related to later behavioural disturbances and psychopathology. Experiencing stressful or difficult life events may convey negative information about one's self-competence, which can lead to an increase in depressive symptoms, particularly in childhood when individuals' cognitive styles are still developing (Tram & Cole, 2000).

Examining both parent distress and NLE together in the same model may be particularly important. For instance, Yerkey and Wildman (2004) examined maternal distress and NLE as predictors of psychosocial problems in typically developing children. Without knowledge of maternal distress or life events, physicians correctly identified 21% of the children with a psychosocial problem. With this added information, physicians improved their identification rates to 39-57%. To date, no study has examined the combined contribution of parent distress and NLE in predicting depression in youth with ASD, while at the same time taking into account differences in vulnerabilities (intellectual functioning and youth age).

The combination of multiple risk factors is critical for the study of depression in individuals with ASD. Stressors can play important roles in the development of psychopathology in individuals who are already vulnerable, and this may be the case for the combination of parent distress and exposure to NLE. The purpose of this study was to examine the relations among parent psychological distress, NLE, and depression in youth

with ASD, and examine the combined influence that such stressors can have. The study also explored how these stressors interacted with the vulnerabilities of ASD and age. We hypothesized that (1) youth who are older or reported to have average or above average intellectual functioning (i.e., vulnerabilities) would have greater depressive symptoms than younger children or those with an intellectual disability, that (2) parent distress and NLE (i.e., stressors) would be related of depressive symptoms, and that (3) the vulnerabilities of age and intellectual functioning would moderate the relationships between parent distress and youth depressive symptoms, and between NLE and youth depressive symptoms.

METHODS

Participants

Participants included 91 parents of youth and young adults diagnosed with an ASD ranging between the ages of 7-25 years (82% males; *M* age = 13.40; *SD* = 5.07). Parents ranged in age from 31 to 62 years (90% mothers; *M* age = 44.32; *SD* = 7.27). Socioeconomic status (SES) was estimated based on the parents' estimated median income using the forward sortation area (first three digits) of their postal codes, which corresponded to a median income from Statistics Canada's Canadian Census (2006). Other studies have used the forward sortation area method for determining an estimate of median family income and SES for participants (e.g., Minaker et al., 2006; Ahuja et al., 2012). The median neighbourhood income was less than $60,000 CAD for 40.7% (*n* = 37) of the sample, between $60,000 and $79,999 for 29.7% (*n* = 27), and greater than $80,000 for 28.6% (*n* = 26).

Parents indicated whether their child was at least in the average intellectual functioning range (56%), or whether they had some form of intellectual disability (44%). Previous studies have used similar cut-off points to examine the relationship between intellectual disability level and negative outcomes, such as child maltreatment and mental health problems (Weiss, MacMullin, Waechter, & Wekerle, 2011; Emerson, Einfeld, & Stancliffe, 2010).

Procedures

The current study was part of a larger online study of Canadian parents of youth with ASD. Parents were recruited through websites, newsletters, and email lists specific to Asperger's and Autism organizations in Canada (e.g., Asperger Society of Ontario, Autism Ontario). Convenience and snowball sampling was employed during recruitment. Parents who were interested in participating were forwarded a link to complete the survey online. The survey took approximately 25 minutes to complete. Informed consent was obtained from all parents prior to completing the online survey. This research was approved by the University's Research Ethics Board.

Measures

Negative life events. Negative life events were measured using an adapted list of events from the Psychiatric Assessment Schedule for Adults with a Developmental Disability, which is completed by the parent or caregiver (PAS-ADD; Moss, Patel, Prosser & Goldberg, 1998). Participants were asked to indicate whether their child with ASD had experienced any of 20 significant life events in the past 12 months. The negative events provided included: Death or illness in family member or friend (32%), an important transition (25%), serious problem with a close friend (14%), change in

residence (14%), something valuable lost or stolen (8%), problems with police or other authority (8%), serious illness or injury (6%), unemployment (5%), recent trauma/abuse (5%), and loss of staff (4%), break up of steady relationship (3%), separation or divorce (3%), alcohol problem (3%), drug problem (3%), major financial crisis (1%), and sexual problem (1%). One point was recorded for each NLE that parents endorsed. Half of the sample (54.9%) reported at least one NLE, 31.9% had experienced 2 or more, and 14.3% reported at least three NLE.

Parent psychological distress. The Kessler Psychological Distress Scale (K6; Kessler et al., 2002) was used as a measure of non-specific psychological distress for parents. Participants were asked to rate the extent to which they felt certain ways over the past 4 weeks. The six-item measure is rated on a five-point Likert scale ranging from 0 (*None of the time*) to 4 (*All of the time*). Scores range from 0 to 24 with higher scores indicating greater psychological distress, and scores above 13 indicating the likelihood of serious mental health problems (14% of parents). Chronbach's alpha for the Kessler 6 was .88 for the current study.

Youth depression. The Glasgow Depression Scale - Carer Supplement (GDS-CS; Cuthill, Espie, & Cooper, 2003) is the informant version of the Glasgow Depression Scale for people with a Learning Disability (GDS-LD). The scale is composed of 16 items that describe observable depressive symptoms in a family member with a developmental disability. Parents rated how often their child had experienced each symptom within the past week. Responses range on a 3-point Likert scale from 0 (*No/Never*) to 2 (*Always/A lot*) with higher scores indicating greater depressive symptoms. The original internal consistency was $\alpha = .79$ in the current sample.

As the GDS-CS has not been previously used for individuals with ASD, the scale was examined using an exploratory factor analysis to investigate the structure and reliability in this ASD sample. The scree plot supported a scale with 3 factors. However, the polychoric correlation matrix revealed correlations (r = .24 to .57) among three items (4, 5, and 8), but not with any other items. The three-factor model included items 4 ('Has looked after his/her appearance?'), 5 ('Has spoken or communicated as much as he/she used to?'), and 8 ('Has still taken part in activities which used to interest him/her?') loading on Factor 2, item 13 ('Has been sleeping during the day?') loading on Factor 3, and all other items loaded on Factor 1. Based on the lack of construct similarity among the grouping of the items for Factors 2 and 3, a one-factor model comprising the remaining 12 variables was used in the current study (Chronbach's α = .80), with scores ranging from 12 to 31, out of a possible high score of 36 (M=19.80; SD=4.59). The lack of construct similarity in this sample of youth with ASD is not surprising, and is in line with previous studies showing a lack of construct similarity for other internalizing disorders (White et al., in press). Individuals with ASD may show atypical presentations of internalizing disorders compared to individuals without ASD (Kerns & Kendall, 2012), which highlights the need to examine anxiety and depression measures for use with the ASD population.

RESULTS

Variables were inspected for normality by examining histograms and using the Shapiro-Wilk test for skewness and kurtosis. As shown in Table 1, child depression, parent distress, and NLE had significant Shapiro-Wilk tests ($p < .05$). Visual inspection of the histograms suggested that all variables were positively skewed, and child

depression and parent distress variables were transformed with a log transformation. Following transformation, the skewness and kurtosis *z*-scores indicated that normality had improved. All following analyses and tables use the transformed variables unless otherwise indicated.

Insert Table 1-2 here

Hypothesis 1: The Relationship Between Youth Vulnerabilities and Depression

Pearson correlations, independent t-tests, ANOVA, and Chi-square analyses were calculated to examine whether youth vulnerabilities were related to youth depression. As shown in Table 2, youth depression scores were negatively correlated with youth age, r = -.24, p = .02, representing a small to medium effect size. There were significant differences in depression scores between intellectual functioning levels, $F(1,89) = 5.52$, p = .02, $\eta^2 = .06$, with higher depressive symptoms for individuals with at least average intellectual functioning compared to those with some form of intellectual disability. As shown in Table 2, none of the other demographic variables or vulnerabilities were significantly related to each other.

Hypothesis 2: The Relationship Between Stressors and Depression

Pearson, point bi-serial correlations, and Mann Whitney tests were used to test the relationship between stressors and depressive symptoms in youth. As shown in Table 2, parent distress and NLE were positively correlated with youth depression, and positively correlated with each other. Further analysis revealed that while depression scores did not differ significantly among individuals with 0, 1, or 2 life events (all p's = .70-.99), individuals who had 3 or more life events had greater depression scores (M = 3.11, SD =

.19) than individuals with fewer life events (with *p* values ranging between .01-.06 depending on the number of NLE). As such, the NLE variable was dichotomized (0-2 NLE; 3 or more NLE) for all analyses. Overall, youth with 3 or more NLE had significantly higher depression scores compared to those with 0-2 NLE ($M = 2.93$, $SD = .23$, $t(89) = -2.57$, $p = .01$, $d = .85$). Mann Whitney tests were performed to determine whether depression scores differed between those who had experienced each individual life event compared to those who had not (tests were performed for items with at least 5% endorsement from the sample). Depression scores differed between youth who had experienced serious problems with a close friend (M = 3.15) and those who had not (M = 2.93), U = 218.00, z = -3.01, $p = .003$. Depression scores also differed between youth who experienced a change in residence (M = 3.12) and those who had not (M = 2.94), U = 239.00, z = -2.46, $p = .01$.

Hypothesis 3: Youth Vulnerabilities as Moderators of Stressor and Youth Depression

A moderation analysis including both stressors (parent distress and NLE) and vulnerabilities (youth age and intellectual functioning) was conducted to test the hypothesis that youth vulnerabilities would function as moderators of youth depression. The regression model included 5 blocks, entered in the following order: i) median income, ii) NLE, iii) parent distress, iv) vulnerabilities (i.e., intellectual functioning, youth age), v) the product of any significant stressor and significant vulnerability factor. Median income was entered given its correlation with age. Variable centering was performed on all continuous predictors. An interaction term was only calculated if the vulnerability was found to be a significant predictor.

Parent distress and NLE as predictors. Several main effects were significant, as shown in Table 3. After controlling for median income, NLE (β = .27, p = .02) was found to be a significant predictor of youth depression. However upon insertion of parent distress (β = .37, p = .001) in Step 3, NLE ceased to be significant. Youth age (β = -.29, p = .01) emerged as a significant predictor, and intellectual functioning approached significance (β = -.19, p = .05) with individuals with at least average intellectual functioning having higher depression scores that those with some form of intellectual disability. None of the interactions were significant, suggesting that neither youth age nor intellectual functioning level moderated the relationship between parent distress and youth depression. The overall final model accounted for 34% adjusted variance.

As the relationship between parent distress and NLE was characterized by a positive correlation, r = .27, p = .01, additional analyses were conducted to test the hypotheses that youth vulnerabilities would moderate the relationships between a) parent distress and youth depression, and b) NLE and youth depression, separately. The regression models included 4 blocks, which were entered in the following order: i) median income, ii) stressor variable (i.e., parent psychological distress or NLE), iii) vulnerabilities (i.e., intellectual functioning, youth age), iv) the product of the stressor and any significant vulnerability factor.

Parent psychological distress as a predictor. After controlling for median income, parent distress (β = .42, p < .001), youth age (β = -.28, p = .01), and intellectual functioning (β = -.21, p = .04) emerged as significant predictors of depression (see Table 4). None of the interactions were significant, suggesting that neither youth age nor ASD

diagnosis moderates the relationship between parent distress and youth depression. The overall model accounted for 31% adjusted variance.

Negative life events as a predictor. After controlling for median income, NLE (β = .27, *p* = .01) and youth age (β = -.23, *p* = .02) emerged as significant predictors of youth depression (see Table 5), while intellectual functioning (β = -.20, *p* = .06) approached significance. Again, none of the interactions were significant; however, the overall model remained significant, accounting for 18% of the variance.

Insert Tables 3-5 here

DISCUSSION

The main aim of the study was to investigate the relations among stressors and youth vulnerabilities as they relate to depression in individuals with ASD. In terms of vulnerabilities, both intellectual functioning and age were associated with youth depression. As expected, parents reported higher depression scores for youth with at least average intellectual functioning compared to youth with an intellectual disability. Previous research has shown that individuals with ASD who have less severe social and linguistic impairments tend to show the highest level of depressive symptoms compared to those with more severe ASD symptoms (Sterling et al., 2008), and those who perceive themselves as dissimilar from their peers seem to be at the greatest risk (Hedley & Young, 2006). Studies in which all individuals with ASD have at least average intellectual functioning may not show significant relations between emotional difficulties

and ASD symptom severity due to the restricted range of IQ (e.g., Strang et al., 2012; Cederlund et al., 2010), whereas studies that explore a wider range of intellectual functioning levels such as ours may be more likely to find a significant differences (e.g., Lecavalier et al., 2006; Mazurek & Kanne, 2010). Emerging literature on internalizing disorders also suggests that impairments in emotion regulation may be inherent in ASD (Mazefsky et al., 2013), so acknowledging a balance between psychiatric diagnoses and emotion dysregulation in assessment and treatment of mental health problems may be important. Future studies may consider examining emotion regulation as an individual vulnerability in both research and clinical work with youth with ASD.

Unexpectedly, youth age was *negatively* correlated with symptoms of depression. This finding contrasts several previous studies in the typically developing and ASD literature that have reported that depressive symptoms increase with age (Mayes et al., 2011; Lecavalier et al., 2006; Nagar, Sherer, Chen, & Aparasu, 2010). This study is not the first to report this relationship for youth with ASD. Simonoff and colleagues (2013) used the Strengths and Difficulties Questionnaire (SDQ) to examine changes in emotional problems over time for adolescents with ASD (from 12 to 16 years), and found significant reductions in psychiatric problems when using the mean changes in SDQ scores and the general population cut-offs for diagnosis. As well, a longitudinal study of youth and adults with ASD (10 to 52 years of age) reported reductions in parent reported child internalizing symptoms over a 4.5-year period (Shattuck et al., 2007), suggesting that symptoms of sadness and withdrawal in individuals with ASD may lessen, not worsen, with development. More research on the trajectory of depressive symptomatology in individuals with ASD is clearly needed.

While adolescents and young adults with ASD may have more insight than young children with ASD, and therefore, be more capable of conveying their emotional problems (Ehlers & Gillberg, 1996, as cited by Kuusikko et al., 2008), it does not necessarily mean that younger children do not experience depressive symptoms. It makes clinical sense that while younger children with ASD may not be able to explain their emotional difficulties to the same extent as older youth, they struggle with them all the same (Strang et al., 2011). The use of parent report in understanding emotional problems in youth with ASD may provide valuable information about the mental health of younger children with ASD, who are unable to articulate their inner experience.

Our second goal involved an examination of the relations between stressors and depression in youth with ASD. Youth whose parents reported high levels of distress were found to have elevated depressive symptoms, which is in line with past research (Marmorstein & Iacono, 2004; Totsika et al., 2011). The present study also found that exposure to 3 or more NLE for the youth with ASD was associated with greater depressive symptoms than exposure to fewer or no life events in the past 12 months. Other studies have reported that an accumulation of NLE over time can increase the risk of negative psychological outcomes for individuals with ASD (Ghaziuddin et al., 1995) and other developmental disabilities (Hastings et al., 2004). Certain life events may be particularly impactful in the ASD population. For example, the current study noted that youth with difficulties with friendships or those who changed their residence in the past 12 months had elevated depression scores. These types of negative experiences can be especially difficult for youth with ASD who already have challenges with social interactions and transitions. In addition, while the parents reported on their child's life

events, some life events may also be directly linked to the parents (e.g., financial difficulties). It is important to acknowledge the impact of these negative events on a child's psychological wellbeing as other family members also experience the negative events.

Although there were significant main effects of youth age and intellectual functioning, these vulnerabilities did not moderate the relationship between the stressors and youth depression. While parent distress and NLE both relate to depressive symptoms, the association is present in both those with and without intellectual disability and at different ages. Esbensen and Benson (2006) reported similar findings in their study examining the role of environmental stressors and individual attributions on depressed mood in adults with mental retardation, with significant main effects but a lack of any interactions. The current results may suggest two areas for intervention. First, youth with ASD who are exposed to multiple negative events may benefit from building resiliency (Emerson & Hatton, 2007) and, second, given the relationship between parent distress and youth depression, further work on parent psychological interventions (Blackledge & Hayes, 2006; Dykens, Fisher, Taylor, Lambert, & Miodrag, 2014) may be beneficial for the mental health of both parents and their children with ASD, regardless of the age or level of youth intellectual functioning.

This preliminary investigation has several limitations. First, it is possible that the convenience sampling and recruitment is biased towards parents who are motivated to participate and are already part of ASD organizations. Alternatively, this sampling method could have resulted in parents with more difficulties responding to the survey to discuss their challenges. Some parents may try to portray their situation as more positive

than it is, while others over-report their child's mental health problems (Briggs-Gowan, Carter, & Schwab-Stone, 1996). Second, we relied on parent, and mostly maternal, report, raising the issue of shared variance, which may overestimate the relationship among the significant variables, and leave out important objective information on intellectual functioning and internal symptoms of depression. It may also be challenging to detect symptoms of depression in youth with ASD, with self or parent report, especially for those with more severe communication impairments (Lord & Paul, 1997). Although self-report for mental health issues is essential for individuals who are able to reflect on their emotional states, there is a role to play in using parent report to obtain information about observable cues relating to a child's internal distress, particularly in youth who may not be able to provide this information themselves. Third, the study was cross-sectional and the results cannot give an indication of causality. Although the study investigated exposure to NLE as a predictor of depression, it is possible that when youth with ASD experience stressors that contribute to mental health problems, these problems then lead to negative consequences and further ASD-related stressors (e.g., greater social impairment, more severe ASD symptoms), furthering the generation of stress (Wood & Gadow, 2010). Similarly, while parent distress was studied as a predictor of youth depression, it is possible that the challenges of having a child with emotional problems could lead to greater distress for the parents (Totsika et al., 2011). Fourth, while a factor analysis was completed with the GDS, the scale has not previously been used in youth with ASD and may be detecting emotion dysregulation or distress more generally as opposed to depressive symptoms. Validated measures that have been used with individuals with ASD may be more sensitive to the age-related changes in depression that

have been noted in other studies (Mayes et al., 2011). Finally, this study was exploratory in nature and primarily aimed to reduce Type 2 error. While the study could have employed a stricter alpha level to control for possible Type 1 errors, the pattern of results is similar to past research. Given the small sample size and the preliminary nature of the study, this research is worthy of further exploration with improved methodology in future studies.

CONCLUSION

This study offers important implications for future research and clinical practice with youth with ASD. Both parent psychological distress and NLE were significantly associated with youth depression, which emphasizes the importance of environmental stressors as correlates of mental health problems for youth with ASD. The finding that youth age and intellectual disability were related to youth depression highlights the need for continued research on the vulnerabilities that predispose youth with ASD to increased mental health problems. The associations reported here suggest that particular care should be given when assessing mental health of children with ASD prior to adolescence and those who have average or above intellectual functioning, as they may be at a greater risk for depression than other youth with ASD. A greater understanding of the stressors and vulnerabilities related to depression is critical for researchers and clinicians who strive to improve the wellbeing of youth with ASD and their families.

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Table 1

Untransformed Variable Means (SD), Ranges, and Tests of Normalcy (N = 91)

Variable	M (*SD*)	Range		Shapiro-Wilk test
		Potential	Actual	
Child depression	19.80 (4.59)	12-36	12-31	.97*
Parent distress	12.54 (5.11)	6-30	6-28	.93**
NLE	1.20 (1.58)	0-20	0-8	.78**

*$p < .05$. **$p < .01$.

Table 2

Correlation analyses of child depression, parent distress, NLE, intellectual functioning, child age, and gender (N = 91)

	NLE	K6	IF	Age	Gender	Income
GDS	.26*	.43**	-.24*	-.24*	.12	-.05
NLE		.27*	-.11	.02	.06	.10
K6			-.02	.09	.01	.15
IF				.20	.11	-.19
Age					.16	-.19
Gender						-.04

Note. GDS = Glasgow Depression Scale – Carer Supplement; NLE = negative life events; K6 = Kessler Psychological Distress Scale; IF = intellectual functioning

*$p < .05$. **$p < .01$.

Table 3

Multiple regression analysis predicting child depression from parent distress, NLE, and child vulnerabilities (N = 82)

Steps	Variable	B	SE	β	*t*	*p*
Step 1	Constant	2.99	.07		46.19	<.001
	Median income	-.02	.03	-.05	-.47	.64
Step 2	Constant	2.80	.10		28.10	<.001
	Median income	-.02	.03	-.08	-.73	.47
	NLE	.18	.07	.27	2.47	.02
Step 3	Constant	2.90	.10		29.67	<.001
	Median income	-.04	.03	-.14	-1.32	.19
	NLE	.12	.07	.18	1.68	.10
	Parent distress	.21	.06	.37	3.46	.001
Step 4	Constant	3.10	.12		25.39	<.001
	Median income	-.07	.03	-.23	-2.34	.02
	NLE	.11	.07	.16	1.63	.11
	Parent distress	.24	.06	.41	4.12	<.001
	Child age	-.01	.01	-.19	-2.90	.01
	Intellectual functioning	-.09	.05	-.29	-1.97	.05
Step 5	Constant	3.09	.12		24.85	<.001
	Median income	-.06	.03	-.23	-2.02	.03
	NLE	.11	.07	.16	1.59	.12
	Parent distress	.30	.18	.52	1.65	.10
	Child age	-.01	.01	-.28	-2.75	.01
	Intellectual functioning	-.09	.05	-.20	-1.96	.05
	Parent distress X child age	-.01	.01	-.04	-.36	.72
	Parent distress X IF	-.04	.12	-.12	-.38	.71

Step 1: $R^2 = .00$, $F(1, 79) = .22$, $p = .64$
Step 2: $R^2 = .08$, $F(2, 78) = 3.18$, $p < .05$
Step 3: $R^2 = .20$, $F(3, 77) = 6.41$, $p < .01$
Step 4: $R^2 = .33$, $F(5, 75) = 7.45$, $p < .01$
Step 5: $R^2 = .34$, $F(7, 73) = 5.25$, $p < .01$

Table 4

Multiple regression analysis predicting child depression from parent distress and child vulnerabilities (N = 82)

Steps	Variable	B	SE	β	*t*	*p*
Step 1	Constant	2.99	.07		46.19	<.001
	Median income	-.02	.03	-.05	-.47	.64
Step 2	Constant	3.03	.06		50.29	<.001
	Median income	-.04	.03	-.13	-1.22	.23
	Parent distress	.24	.06	.42	3.97	<.001
Step 3	Constant	3.22	.10		34.38	<.001
	Median income	-.06	.03	-.23	-2.26	.03
	Parent distress	.26	.06	.45	4.62	<.001
	Child age	-.01	.01	-.28	-2.84	.01
	Intellectual functioning	-.10	.05	-.21	-2.11	.04
Step 4	Constant	3.22	.10		33.33	<.001
	Median income	-.06	.03	-.22	-2.12	.04
	Parent distress	.33	.18	.57	1.81	.08
	Child age	-.01	.01	-.28	-2.70	.01
	Intellectual functioning	-.10	.05	-.21	-2.10	.04
	Distress X child age	-.01	.01	-.04	-.37	.71
	Distress X IF	-.05	.12	-.13	-.41	.68

Step 1: $R^2 = .00$, $F(1, 79) = .23$, $p = .64$
Step 2: $R^2 = .17$, $F(2, 78) = 8.02$, $p < .01$
Step 3: $R^2 = .31$, $F(5, 75) = 8.46$, $p < .01$
Step 4: $R^2 = .31$, $F(8, 72) = 5.59$, $p < .01$

Table 5

Multiple regression analysis predicting child depression from NLE and child vulnerabilities (N = 91)

Steps	Variable	B	SE	β	*t*	*p*
Step 1	Constant	2.99	.06		48.75	<.001
	Median income	-.02	.03	-.05	-.50	.62
Step 2	Constant	2.80	.09		29.68	<.001
	Median income	-.02	.03	-.08	-.77	.44
	NLE	.18	.07	.27	2.61	.01
Step 3	Constant	2.98	.12		24.15	<.001
	Median income	-.05	.03	-.16	-1.57	.12
	NLE	.17	.07	.26	2.63	.01
	Child age	-.01	.01	-.23	-2.31	.03
	Intellectual functioning	-.09	.05	-.20	-1.93	.06
Step 4	Constant	2.97	.13		23.71	<.001
	Median income	-.05	.03	-.16	-1.59	.12
	NLE	.17	.07	.26	2.62	.01
	Child age	-.02	.02	-.45	-1.12	.27
	Intellectual functioning	-.08	.05	-.18	-1.68	.10
	NLE X child age	.01	.02	.22	.55	.58

Step 1: $R^2 = .00$, $F(1, 88) = .25$, $p = .62$
Step 2: $R^2 = .08$, $F(2, 87) = 3.54$, $p < .05$
Step 3: $R^2 = .18$, $F(4, 85) = 4.70$, $p < .01$
Step 4: $R^2 = .18$, $F(5, 84) = 3.78$, $p < .01$